

**LIFE HISTORY AND BIOLOGY OF  
*SACCOLINA CARCINI* (CIRRIPIEDIA:  
RHIZOCEPHALA) PARASITISING *LIOCARCINUS*  
*HOLSATUS* (DECAPODA:  
BRACHYURA)**

Among the six Rhizocephala families, the Sacculinidae comprise the largest number of species. *Sacculina carcini* has been reported to infect species of grapsid, xanthid and portunid crabs, the latter including *Liocarcinus holsatus* (Boschma, 1955). In this study, samples of *Liocarcinus holsatus* were obtained from a beam trawl (2m wide with a 19mm mesh net and a 9.5mm cod-end) at approximately monthly intervals from a depth of 3–20m around the Gower Peninsula, South Wales, U.K. (15°35'N, 04°07'W). Each trawl, at a speed of 3–4 knots, was of 20 to 30 minutes duration. All crabs were examined for infection by *Sacculina carcini* and some of the infected ones (>200) were tagged and maintained in recirculating seawater systems for observations on *Sacculina* growth and reproduction.

**Results and Discussion**

Of a total of 976 male and 1166 female crabs caught, 35.7% of the males and 38.6% of the females were infected by *Sacculina carcini*. Double and triple externae infections were low (<2%) and occurred mainly in males. The time and magnitude of peak abundance of the different stages of infection differed between years. However, the timing and sequence of the life history events of *Sacculina* was very much related to that of its host (Day, 1935; Heath, 1971; Lützen, 1984).

Externae started growing as early as February or March but the growth of these in the autumn cohort was slow when compared with those which emerged and grew in summer. Externae grew from emergence to 3mm in width in about a week but many did not grow beyond this size unless impregnated by male cyprids, and eventually died leaving a scar. Emergence of externae occurred without the host having to moult. Overall externae growth rate (temperature dependent) was  $5.5 \pm 2.1$  S.E. mm/month in the field and  $8.3 \pm 1.7$  mm/month in the laboratory. Eggs were present in the mantle cavity throughout the year but were most abundant in winter and again in summer. In the field, eggs began hatching in March or early April, reached a peak between June and August and stopped in late October or early November. In the laboratory, two broods of eggs ( $5\text{--}12 \times 10^4$  each), at an interval of about one month during April–October and four months during December–March, were produced. Both the eggs in the mantle cavity, and the nauplii produced, were of two size classes; the smaller being the females. The length of the internal phase of *Sacculina* infecting *L. holsatus* was

estimated to be between 5 and 12 months ( $x = 8.3$  months) and the externae were estimated to live between 6 and 13 months ( $x = 8.0$  months).

Only adult crabs ( $\geq 20$ mm CW) could be classified as being highly feminised. These resembled females in their external morphology and behaviour (Choy, 1986). Apart from imposing metabolic stress upon the host, *Sacculina* impairs if not completely stops its growth and reproduction (Lawler and Shepard, 1978; Rubiliani, 1983). Infection by *Sacculina* decreased growth rates by up to 30% in males and 25% in females for each year of infection. During this period, egg production was reduced by up to 62%. For commercially important portunid crabs such as *Necora*, *Ovalipes*, *Portunus*, *Scylla* and *Thalamita*, infection by *Sacculina* can have a disastrous effect on the fishery. Weng (1987) has shown that the normal management practice of protecting smaller crabs can result in higher infection by *Sacculina*. Under these circumstances, management strategies will need to be modified.

**Literature Cited**

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Satish C. Choy, *Universiti Brunei Darussalam, Gadong 3186, BSB, Brunei Darussalam.*